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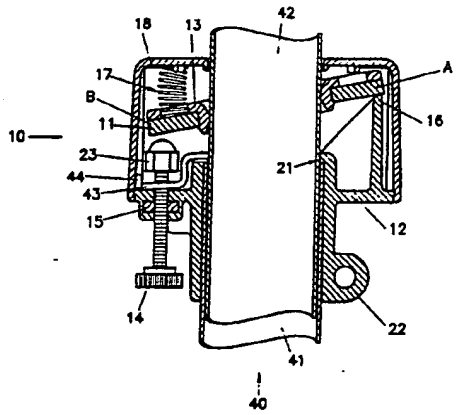

(57) Abstract

A safety clutch mechanism (10) for use with utility tripods having telescopically extensible members, such that a single member may be extended a distance and maintained at that distance under an opposing load force. The disclosed clutch device being further capable of allowing continuous, smooth, and controlled compression of the telescoping members in a fashion conducive to increased safety for the operator. By permitting single hand operation, the clutch mechanism reduces the labor intensive task suitable for a single person to operate multiple devices in compression. The clutch mechanism also permits the setting of a desired compression rate automatically. This is accomplished by incrementally reducing the frictional engagement force of the locking mechanism so that it is slightly less than the gravity induced force on the opposing load. Further differentiation of the two forces, in favor of the gravity force, will increase the compression rate. The removal of any load without undesirable extension is accomplished through use of a locking tab which may be frictionally engaged with the extensible feature to prevent such extension while an upward force is applied to the load. Componentized features of the clutch mechanism allow maintenance of the entire device without discarding functional components because of the risk of reduced safety due to damaged components.

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HIGH LOAD SAFETY CLUTCH MECHANISM FOR USE WITH TELESCOPICALLY EXTENSIBLE UTILITY POLES

I. TECHNICAL FIELD

This invention relates to safety clutch mechanisms for use with telescoping poles, and particularly to safety clutch mechanisms with controllable release. Specifically, the disclosed invention relates to high-load safety clutch mechanisms having a means for controlling the rate of compression of an inner telescoping pole within an outer pole.

II. BACKGROUND OF THE INVENTION

In the music industry, performance stages are repeatedly being erected and broken down. This includes not only the stages, lighting and instrument stands, but also the sound equipment as well. While the bulk of this sound equipment can be positioned at or below the stage level, it is very important for sound quality that speakers be placed at various key points, and at various heights. Sometimes these heights are well above stage level.

To provide the proper amount of support and stability to these raised speakers, utility tripods have been developed with telescoping poles, or tubes. After the speaker is secured onto the top platform of the tripod it is raised to the desired height and locked into position. The locking mechanism is usually something like a pin, a locking collar, a cam mechanism, or a variation of a cramp mechanism. It is the latter of these mechanisms to which the present invention is concerned with. As shown in U.S. Patent Nos. 366014 to Maschmeyer, and 388195 to Hammond et al. cramp mechanisms in general have existed for quite a while.

The speakers used for concert events, or other stage performances, may weigh as much as 150 pounds. These heavy loads make it no small task for the person or persons charged to raise or lower them to the desired position. The hoisting process can be particularly dangerous as one considers that these poles typically have smooth outer surfaces and a firm grip is sometimes lost. The cramp

brake is designed such that under a load the downward motion of the inner telescoping tube causes the brake to lock the descent of the pole. This is an important safety feature when the load is to be raised.

As mentioned previously, however, the poles must also at some time be lowered in order to compact the equipment for storage or transport. This can be done in prior art devices by disengaging the cramp mechanism and lowering the speaker. Because of the way the cramp is designed to work the person lowering the speaker must either permanently disengage the cramp during lowering, as with the designs shown in Hammond et al. and U.S. Patent No. 1674081 to Adams, or with one hand holding the cramp in a disengaged position while lowering with the other hand, as shown in U.S. Patent No. 3480247 to Waner. Either process may work well with very light loads, as is the case with the Hammond, Adams and Waner inventions, but under heavy loads the process is much more difficult and the operator can be put at great risk. For the music industry application, add to this the fact that these speakers are delicate and expensive electronic equipment, and to have one come crashing down from a 10 foot perch would be disastrous. The present invention has solved this problem to the degree that the operator may, with one hand, begin the slow descent of the heavy load and walk away returning to the speaker only after it has safely descended.

Additionally, with respect to applications in the music industry, speakers are typically attached in such a fashion that attempts to remove them would often result in the ascent of the telescoping element. This may become a frustrating and difficult endeavor for one person. The present invention addresses and solves this problem by allowing the operator to lock the telescoping element in position.

One of the intrinsic problems with devices such as those disclosed in the patents to Waner, Hammond et al., Adams, Maschmeyer, and in U.S. Patent No. 2442779 to Oriold is that they operate on an "all or nothing" principle. That is, the cramp mechanism is either fully engaged, providing maximum friction, or completely disengaged, providing no friction. This produces an acceptable safety feature in the ascending mode of operation, but is cumbersome and dangerous to

operate by one person in a descending or compression mode. In British Patent No. 1230843 to Bilberg, discussion is provided on the subject of decreased contact of the locking mechanism as well as ceased contact. In either instance the Bilberg invention would still involve an immediate, uncontrolled descent once the threshold contact was exceeded. Instead of risking injury to the operator or speaker destruction, such devices when used with heavy loads would likely require two or even three persons to successfully lower the telescoping poles. This presents additional problems. By requiring so many persons to partake in the operation, the task becomes very labor and time intensive, and costly.

The present invention, in its various embodiments, recognizes and addresses these problems and overcomes the limitations perceived by those skilled in the art by presenting a design which, among other aspects, allows for slow continuous compression of a telescoping pole. This element alone may allow a single operator to descend each telescoping pole in less time than a crew of three. Those skilled in the art of telescoping support poles and clutch mechanism design have long been aware of the problems of operator safety without controlled descent. Yet no commercially acceptable solution has been available in spite of the fact that the necessary arts and elements for implementing the disclosed invention have existed for sometime. The patents cited show that cramp mechanisms, as they are commonly called, have existed for over 100 years. Improvements have come in the way of greater locking and load ability, and widespread adaptation to uses in various fields. However, a clutch mechanism which integrates the elements of safety, variable compression rate regulation, and single operator control into a utility tripod telescoping pole has not existed until the present invention. Instead of understanding the true problem, manufacturers and users have coped with the inherent limitation to some of these devices and accepted such limitations as necessary for an inexpensive device. There appeared to be a failure to fully understand the problems and impacts of being able to safely descend a heavy load, such as a sound system speaker, using a clutch mechanism on a telescoping pole.

III. DISCLOSURE OF INVENTION

The present invention discloses a safety clutch mechanism to operate in conjunction with a telescoping pole, such as used in supporting sound system speakers at a live stage performance. The device provides a reliable and effective means for safely lowering even a heavy load attached to the top of a telescoping pole. Rather than supplying a system which affords only an incremental increase in performance and design over the prior art, the present invention utilizes techniques which were not previously considered to achieve leaps in performance compared to the prior art. This invention serves to optimize safety for the operator by requiring less interaction and handling of the heavy loads during descent, to optimize the labor costs required by allowing less operators to lower even the heaviest of suitable loads, and to optimize equipment life by providing reversible features on highly stressed components.

In general terms, the invention involves various embodiments of a safety clutch mechanism. Many of the elements of this device achieve several different objects which, when combined, act to achieve the mentioned leaps in performance. In the preferred embodiment, the invention discloses an insert made of a polyamide for producing numerous degrees of frictional engagement with the inner telescoping pole to allow controlled load descent by a single person. The device may also feature a damping mechanism which permits the telescoping pole to be hand carried horizontally without accidental extension, and also prevents the characteristic "chatter" which may occur as the cramp bounces during compression. Still other features of the present device include an incremental adjustment mechanism which allows for the realization of the numerous degrees of frictional engagement of the frictional insert.

Importantly, the invention breaks from several time-honored traditions in clutch mechanisms. While drawing from some of the important conditions demanded of these devices for providing an effective locking mechanism, the invention expands upon these conditions in an effort to provide a safe and reliable device during compression. By recognizing and utilizing the advantages of a replaceable insert having a radiused inner surface, and designed with synthetic material for appropriate friction the present invention achieves its goals.

Accordingly, the present invention provides a high load safety clutch mechanism which allows slow continuous compression of a telescoping pole. The stated safety clutch acts to frictionally engage the inner telescoping pole to restrict compression while allowing expansion to occur if so desired. The safety clutch includes a replaceable snap-fit frictional insert which is capable of providing numerous degrees of frictional engagement with the inner telescoping pole. In addition the insert is reversible within an axially symmetric locking plate, in order to increase the amount of use possible from the insert. As a means for enhancing the range of frictional engagement possible, as well as the wear resistance and load-carrying characteristics, the inner surface of the insert is radiused. To control the rate of compression of the telescoping pole the angle of inclination——which directly relates to the amount of frictional engagement——is incrementally adjusted until the desired rate is achieved.

One object of the present invention is to provide a design which provides increased operator safety in the compression mode. It is therefore an object for the present invention to allow the operator to set a desired compression rate of the telescoping poles. It is also an object to avoid disengaging the locking mechanism completely during compression. This provides single hand operation to activate the compression mode. It is also an object that the operator be permitted to activate the compression mode of the invention and leave the invention to compress automatically with no further interaction by the operator.

It is a further object of the present invention to provide a design which allows for a single operator to lower an otherwise unmanageable load. It is thus an object that the operator never need to manually support the load during the compression mode. It is also an object that the present design allow the operator to manually assist the descent of the load without increasing the automatic unattended rate of compression.

Another object of the present invention is that it be designed to permit horizontal or even inverted locking with no external applied load. It is an object that the device maintain a locked condition while compressed without inadvertently

expanding during transport. It is also an object that the present invention should perform in a locking fashion during expansion mode. Similarly, it is an object that the present invention provide a design which is capable of locking the telescoping feature to permit removal of the load.

A further object of the present invention is that it be designed in a manner to allow maximum cost effectiveness, without compromising safety. Such cost effectiveness can be achieved through use of molded and snap-fit components. It is also an object that the present device be designed to permit quick and easy assembly. This will help to minimize cost of manufacture as well. It is still another object of the invention to minimize possible erroneous assembly. By designing components which cannot be put in backwards or upside down assembly is made much simpler.

Naturally, further objects of the invention are disclosed throughout other areas of the specification and claims.

IV. BRIEF DESCRIPTION OF DRAWINGS

The following descriptions and referenced drawings are for selected preferred embodiments of the present invention. Naturally, changes may be made to the disclosed embodiments while still falling within the scope and spirit of the present invention and the patent granted to its inventors.

Figure 1 is a cross section of one embodiment of the disclosed invention in a locked position.

Figure 2 is a top view of the locking plate and frictional insert.

Figure 3 is a cross section of the frictional insert showing the preferred radiused inner edge.

Figure 4 is an exploded view of a similar embodiment as that shown in figure 1.

Figure 5 is a graph illustrating the rate of compression of the present invention compared with prior art devices.

V. BEST MODE(S) FOR CARRYING OUT THE INVENTION

As can be understood from the drawings, the basic concepts of the present invention may be combined in many different ways. Figure 1 shows a cross section of device (10) attached to outer tube (41) of telescoping pole (40), and engaging inner tube (42) to lock the extended position. The basic elements of the preferred embodiment include locking plate (11), base (12), and frictional insert (13). It should be understood that while the following discussion refers to the telescoping pole in terms of ascent and descent, or raising and lowering——both of which would indicate a vertical telescoping arrangement——the terms extension and compression, or the like——which would include both a vertical and horizontal telescoping arrangement——should be considered synonymous. The present invention is designed to work in either orientation.

Referring now to figure 1, it can be seen that base (12) is provided with lip (21) as a means for retaining device (10) on telescoping pole (40). Base (12) may be slipped over inner tube (42) and slid toward outer tube (41) until lip (21) abuts with the end of outer tube (41). It can be seen in figure 1 that a portion of base (12) surrounds the end of outer tube (41). As a further means for retaining device (10) on telescoping pole (40), clamp (22) is provided as an integral element. With the use of a nut and bolt assembly, clamp (22) may be tightened to engage outer tube (41) to prevent slippage of device (10). In the present embodiment these two elements are designed to work together to retain device (10) on telescoping pole (40). Either clamp (22) or lip (21) could be the sole means, however, in other embodiments. While clamp (22) is shown to be an integral member of device (10) it is certainly intended that the means for retaining may encompass any other device, separate or integral to device (10), suitable for the purpose of retaining

device (10) onto pole (40). The need for the means for retaining is necessitated by the fact that device (10) need not be an integral component of telescoping pole (40), as with most of the prior art devices. This is an important element because it allows the replacement of either pole (40) or device (10) if they should become damaged. More importantly, the detachability of device (10) allows damaged components to be repaired or replaced with little effort or expense. This will be discussed in more detail.

Continuing with figure 1, this embodiment shows thumbscrew (14) providing the adjustable means for varying frictional engagement and threaded through base (12). The distal end of thumbscrew (14) is provided with cap nut (23), which when moved to the lowermost setting of thumbscrew (14) engages locking tab (43) forcing it against inner tube (42). To counter the reverse force exhibited upon thumbscrew (14)——which may cause it to bind——dual posts members (44) are provided on the side of thumbscrew (14) opposite inner tube (42). Thumbscrew (14) is held in position by machine nut (15). The use and exact function of thumbscrew (14) and locking tab (43) will be more apparent in the discussion of operation. On the opposite side of base (12) is located pivot member (16). Pivot member (16) serves to maintain one end of locking plate (11) elevated at a functional height. This functional height is very important——and easily determined——to the operation of device (10). If the height is set too low a proper locking inclination would not be provided.

Locking plate (11) is superiorly situated to base (12) and surrounds inner tube (42), functioning as a means for maintaining tube (42) in an extended position. As just discussed, one side or end of locking plate (11) is held aloft by pivot member (16) while the opposite side or end is yieldingly biased downward by spring (17), in this embodiment. Naturally other means for this bias are possible, such as weight applied to low end (B) of locking plate (11) or the like. Opposing spring (17) in the bias of locking plate (11) is thumbscrew (14). This side of locking plate (11) is biased downward until cap nut (23) of thumbscrew (14) is engaged, or until a locking position is attained. Such a position is achieved when insert (13) becomes frictionally bound onto inner tube (42) and prevents the

compression of inner tube (42) into outer tube (41). As shown in figures 2 and 3, the shape of locking plate (11) in this embodiment is somewhat oblong. This is not a necessitated shape, and certainly other shapes, such as circular, may be utilized with equal suitability.

Referring now to figure 2 it can be seen that within locking plate (11) is affixed the aforementioned frictional insert (13). Inherent to telescoping tubes is the ability or means for permitting compression of a small diameter tube into a larger diameter tube. In the present invention, insert (13) acts to create a slow, continuous movement or compression of inner tube (42) within outer tube (41). To provide such controlled movement insert (13) is designed with radius (25). Through trial-and-error it is believed that a radius no more than .125 inches works best for this feature. This size requirement is not one of mere choice, but rather serves an important functional purpose. That is, larger radii tend to wedge onto inner tube (42) and release suddenly, creating the same effect as the prior art devices as illustrated in figure 5. In addition, insert (13), in this embodiment, is snap-fitted within plate (11) to allow easy assembly, or even rotation as one inner edge may become worn. Insert (13) could be designed, however, as part of locking plate (11), such that they are one-piece. Ultimately, when both inner edges of insert (13) are worn beyond sufficient functional requirements, insert (13) may be replaced. The design of insert (13), is such that it will wear on the top surface of high end (A), and the bottom surface of low end (B) during use. By reversing the orientation of locking plate (11) low end (B) becomes high end (A), and vice versa. The symmetry of insert (13), as shown in figure 2, simplifies assembly of device (10). That is, the assembler does not have to spend time figuring out the front and back of each piece as it practically cannot be improperly oriented within locking plate (11).

An advantage to the use of insert (13) with locking plate (11) is related to the materials of which they are made. Prior art devices have not apparently given much thought to the use of polyamide materials for cramp mechanisms. This may be because of its inferior strength when compared to most metals, even though it may provide ideal frictional engagement. Additionally, polyamide materials have

favorable wear characteristics. The present invention has combined the advantages of each material to provide a strong locking mechanism with variable, and controllable, degrees of frictional engagement, and excellent wear characteristics.

To eliminate extraneous interference with the operation of device (10) the components are concealed by housing (18), as shown in figure 4. Housing (18) is slipped over inner tube (42) and brought down to cover locking plate (11), and the other internal components. Housing (18) also serves as the support surface which allows spring (17) to bias locking plate (11). For this reason the interior height of housing (18) should be limited so as not to require too large a spring. By making housing (18) only slightly taller than the elevated position of high end (A) of locking plate (11) material costs may be minimized as well. The present embodiment is designed such that housing (18) snap-fits onto base (12), as shown in figure 1. Several designs for this snap-fit are possible, as is well known by those skilled in the art. Housing (18) may also be designed such that it is attached by other conventional means, such as, but not limited to nuts and bolts, machine screws, adhesives, clamps, or the like. The scope of the present invention is intended to cover such minor modifications. It has been anticipated that the exterior of housing (18) may provide adequate surface area for attachment of trademarks, operating instructions, and/or safety labels as well.

The preceding discussion characterizes a single embodiment of the present invention. Many of the disclosed elements have suitable replacement components known by those skilled in the relevant field, and are too numerous to practically enumerate. Where suitable replacements are known it is intended that these components be included within the scope and spirit of the patent granted on the present invention.

In order to further understand the present invention it is desirable to discuss device (10) as it functions in operation. Referring to figure 1, the process for raising a high load secured to the free end of inner tube (42) can be understood. By "high load" it is meant that the present embodiment is designed to elevate

objects greater in weight than that which the operator could normally lift with a single hand. However, the embodiment, and particularly radius (25), could naturally be scaled down to function adequately for "light load" objects as well.

The safest way to extend inner pole (42) is to first insure locking plate (11) is sufficiently inclined to cause frictional engagement of insert (13) with inner tube (42). This may be accomplished by lowering thumbscrew (14) so that it is completely disengaged from plate (11). Then inner tube (42) may be raised in any conventional manner. Upon release of inner tube (42) the applied load will cause insert (13), which at this point is fully engaged with inner tube (42), to force locking plate (11) into a locked position.

Referring to figure 3, a cross section of insert (13), it can be seen that the inner edge (24) of insert (13) is partially radiused. A full radiused inner edge has proven to be undesirable because of its difficulty in release. However, it is anticipated that, while not tested, multiple radiuses may work with varying degrees of success. Insert (13), of this embodiment, is made of MoS_2 filled polyamide material. This material is believed to provide increased friction and wear resistance over a standard polyamide, such as nylon 6/6. It may also supply a smoother and more controllable performance by decreasing the differential between the static and dynamic coefficients of friction. Naturally, it is within the scope of this discussion to use other materials known to those skilled in the art which may have relatively close static and dynamic coefficients of friction. The closeness of these parameters is dependent on the materials ability to be adjusted to numerous degrees of frictional engagement between a completely locked position and a disengaged position.

After raising the load it will naturally be desirable at some point to lower the load. With the present invention this process is greatly facilitated, and with a greater degree of safety. To bring the load downward the operator begins to actuate the means for varying the frictional engagement of insert (13). In the preferred embodiment, thumbscrew (14) is such means, but obviously this means could be provided by a conventional screw, or some other adjustable member. The

threaded shaft of thumbscrew (14) gives it an infinitely adjustable range. By turning thumbscrew (14) appropriately, cap nut (23) engages locking plate (11) which is currently in a locked position. Slow turning further biases locking plate (11) toward a horizontal position. As this occurs the frictional engagement of insert (13) with inner tube (42) is decreased. At the point where the magnitude of frictional force is less than the load force inner tube (42) will begin to compress within outer tube (41). As the difference in frictional force and load force is increased the compression rate of inner tube (42) into outer tube (41) is also increased. At any point during descent the operator may back-off thumbscrew (14) to completely engage insert (13) with inner tube (42). After complete descent thumbscrew (14) should be completely disengaged to allow locking plate (11) to settle back into a locked position. Importantly, the entire process may be accomplished with a single hand.

As can be seen in figure 5, the present invention provides a great deal more control than that of any of the prior art devices. Figure 5 illustrates the dramatic differences of performance between prior art devices and the present invention. The solid line represents how minor interactions by the operator, as he turns thumbscrew (14) to engage locking plate (11), can begin a slow, and continuous compression rate of inner pole (42). Further interaction, through continued turning of thumbscrew (14) causes an increased compression rate, until finally locking plate (11) is fully disengaged or "free". On the other hand, while no element is present in the prior art which is completely analogous to thumbscrew (14), interaction by the operator to bring the locking mechanism in a horizontal position typically begins and ends with a fast, uncontrolled descent of the load. This operation is illustrated by the broken line of figure 5.

For increased safety, the operator may wish to begin the load descent and then walk a safe distance from device (10). This may also be helpful in the case where there are a number of poles to descend, for instance at a live public concert with many speakers positioned around a stadium or hall. A single operator could begin the descent of each speaker without having to wait for its completion, saving on valuable man-hours and cost.

Another practice might be to set the compression rate to a slow descent, and then manually pull the load downward. Upon release after each pull the descent returns to its set compression rate. This allows the load to be brought down quicker, by a single person, safely and under complete control.

Spring (17) serves an important function in the descent mode. With many prior art devices, slippage of the cramp mechanism can occur. When this happens, of course, there is a rapid, often catastrophic descent of the inner tube. In addition, rather than the cramp locking again as it is designed to do, there can be a bounce between an engaged and disengaged position causing the inner tube to bounce downward in a choppy and erratic fashion. In the present invention, spring (17) prevents the bounce or chatter effect. If there is a frictional disengagement between insert (13) and inner tube (42) the descent is still smooth, continuous and typically very slow. Furthermore, after telescoping pole (40) has been relieved of its load——a process which is more completely explained later——and is to be carried to a truck or area of storage, it may be held in a downwardly slanted or completely inverted position without fear that inner tube (42) will fall out. This is possible because spring (17) maintains locking plate (11) in a locked position, even upside down. Of course, it is important that after complete descent thumbscrew (14) be disengaged from locking plate (11).

Another important element is locking tab (43). After the load has descended from above, efforts to remove the load from above inner tube (42), while using prior art devices in combination with specific load attachment methods, would merely result in the ascent of inner tube (42). The present invention may act as a two-way clutch which permits the locking of inner tube (42) from either descending——as explained above——or ascending through use of locking tab (43). By turning thumbscrew (14) to its lowest position, locking tab (42) is forced into frictional engagement with inner tube (42). The amount of frictional engagement is sufficient to prevent the ascent of inner tube (42) during removal of the load. As locking tab (43) presses against inner tube (42) it may be forced backwards against thumbscrew (14). In some cases this is sufficient to maintain the necessary frictional engagement of inner tube (14). In other instances thumbscrew (14) will become bound up, and the necessary frictional engagement

may be lost. To counter this problem stationary dual post members (44) are molded adjacent thumbscrew (14) opposite inner tube (42). Post members (44) prevent lateral movement of locking tab (43) in the direction of thumbscrew (14) such that frictional engagement is maintained upon inner tube (42). Naturally, there is a limitless number of variations possible regarding locking tab (43) and dual post members (44). To the extent that any such modifications utilize the basic concept of frictionally engaging inner tube (42) they should be considered to fall within the breadth and scope of the present invention.

Referring again to figure 2, it can be seen that locking plate (11) is designed to be axially symmetric about line a-a. As such, each side then is a mirror image of the other. This allows locking plate (11) to be removed and turned 180° and reinserted when one side of insert (13) becomes too worn. The seat (26) for spring (17) can be seen on both ends of locking plate (11), as the position of spring (17) must also be changed to the opposite end when locking plate (11) is turned. This reversible feature allows the usable life of the insert to be essentially doubled. Alternative designs might allow for a round locking plate to permit even greater increases of usable life. In such a design the locking plate might only be rotated 10° each time, thereby utilizing the full circumference of the inner edge of the insert.

As mentioned earlier, one of the practical elements of device (10) is that it is designed as separate components, which can be removed individually or as an entire unit. This feature allows for the realization of maximum cost effectiveness in manufacturing, and ease of assembly. The materials used for many of the components, such as base (11), and housing (18), in the preferred embodiment are of an impact resistant, dimensionally stable plastic. This material provides an adequate safety factor, as well as being cost effective. In spite of this, it is certainly possible for some of these components to become damaged during normal use or storage. In such an instance the damaged component may be easily replaced without discarding the entire device. This is also the case with the metal components as well. Naturally, should either device (10), or telescoping pole (40)

be completely destroyed, each may be replaced without much trouble, or waste of good materials.

While the designs and concepts disclosed focus upon and may find use for raising and lowering of heavy loads atop telescoping poles, it may also obviously find use in a wide variety of other applications. It, therefore should be understood that while the field of application of the invention is discussed in the limited contempt, the scope of protection afforded is not intended to be so limited. To the extent that elements of the present invention may be modified or substituted for with substantially the same means, which operate in substantially the same way, to achieve substantially the same result, these components should be considered to fall within the spirit and scope of any patent granted on the present invention.

The foregoing discussion and the claims which follow describe the preferred embodiments of the present invention. Particularly with respect to the claims, it should be understood that changes may be made without departing from its essence. In this regard, it is intended that such changes would still fall within the scope of the present invention. It simply is not practical to describe and claim all possible revisions to the present invention which may be accomplished. To the extent such revisions utilize the essence of the present invention, each would naturally fall within the breadth of protection encompassed by this patent. This is particularly true for the present invention since its basic concepts and understandings are fundamental in nature and can be broadly applied. While particular embodiments of the invention have been described, it will be obvious that changes and modifications may be made without departing from the broad aspects of the present invention.

VI. CLAIMS

We Claim:

1. A clutch mechanism for use with telescoping poles having outer and inner tube members, said clutch mechanism comprising:

a. a base surface positioned about said outer tube member;

b. a means for retaining said base surface to said outer tube member;

c. a locking plate having two opposite ends and an opening which allows said plate to be positioned about said inner tube member;

d. a frictional insert positioned within said opening of said locking plate and having an integral means for producing numerous degrees of frictional engagement of said insert with said inner tube member;

e. a pivot member engaging said locking plate proximate to a first end, wherein said end of said locking plate is maintained at a height;

f. a yieldingly biasing member proximate to the end opposite said pivot member of said locking plate;

g. an adjustable means for varying the degree of frictional engagement of said frictional insert with said inner tube member; and

h. a housing connected to said base surface.

2. A clutch mechanism as described in claim 1 wherein said locking plate comprises a means for increasing the usable life of said frictional insert.

3. A clutch mechanism as described in claim 2 wherein said ends of said

locking plate are mirror images and wherein said means for increasing comprises said mirror image ends.

4. A clutch mechanism as described in claim 1 or 3 wherein said adjustable means for varying comprises a screw.

5. A clutch mechanism as described in claim 1 wherein said housing has a consistent height, and wherein said height is slightly greater than the pivot height of said locking plate.

6. A clutch mechanism as described in claim 4 wherein said frictional insert is made from a material having close static and dynamic coefficients of friction.

7. A clutch mechanism as described in claim 6 wherein said frictional insert is made from a polyamide material.

8. A clutch mechanism as described in claim 4 wherein said frictional insert further comprises an inner edge and wherein said integral means for producing numerous degrees of frictional engagement comprises a radius on said inner edge.

9. A clutch mechanism as described in claim 1 or 8 wherein said frictional insert snap-fits into said opening of said locking plate.

10. A clutch mechanism as described in claim 1 and further comprising a means for preventing ascent of said inner tube member.

11. A clutch mechanism as described in claim 10 wherein said means for preventing ascent of said inner tube comprises a means for frictionally engaging said inner tube, wherein said means for frictionally engaging is independent of said locking plate.

12. A clutch mechanism as described in claim 11 wherein said means for preventing ascent of said inner tube comprises a locking tab responsive to said adjustable means for varying.

13. A clutch mechanism for use with telescoping poles having outer and inner tube members, said clutch mechanism comprising:

a. a base surface positioned about said outer tube member;

b. a means for retaining said base surface to said outer tube member;

c. a means for maintaining said inner tube member in an extended position, wherein said means for maintaining is superiorly located to said base;

d. a means for permitting compression of said inner tube member within said outer tube member;

e. a means for creating a slow continuous compression of said inner tube member within said outer tube member.

14. A clutch mechanism as described in claim 13 and further comprising a means for preventing ascent of said inner tube member.

15. A clutch mechanism as described in claim 13 wherein said means for maintaining comprises a locking plate having two opposing ends and positioned about said inner tube member.

16. A clutch mechanism as described in claim 13, 14 or 15 wherein said means for creating a slow continuous compression comprises:

a. a frictional insert mounted within said means for maintaining and having an inner edge, wherein said inner edge is capable of producing

numerous degrees of frictional engagement with said inner tube member;

b. an adjustable means for varying the frictional engagement of said frictional insert with said inner tube member.

17. A clutch mechanism as described in claim 16 wherein said inner edge of said frictional insert comprises a radius.

18. A clutch mechanism as described in claim 17 wherein said frictional insert has a substantial width and wherein said radiused portion of said inner edge extends over less than the full width of said ring.

19. A clutch mechanism as described in claim 17 wherein said radius of said frictional insert is no greater than .125 inches.

20. A clutch mechanism as described in claim 13 or 15 wherein said means for maintaining comprises an integral means for increasing the usable life of said frictional insert.

21. A clutch mechanism as described in claim 15 wherein said ends of said locking plate are mirror images and wherein said means for increasing comprises said mirror image ends.

22. A clutch mechanism as described in claim 18 wherein said adjustable means for varying comprises a screw.

23. A clutch mechanism as described in claim 16 and further comprising a means for preventing ascent of said inner tube member.

24. A clutch mechanism as described in claim 23 wherein said means for preventing ascent of said inner tube comprises a locking tab responsive to said adjustable means for varying.

25. A clutch mechanism as described in claim 15 wherein said means for maintaining further comprises:

a. a yieldingly biasing member on said locking plate;

b. an opposingly biasing member also on said locking plate.

26. A clutch mechanism as described in claim 16 wherein said frictional insert is made from a material having close static and dynamic coefficients of friction.

27. A clutch mechanism as described in claim 26 wherein said frictional insert is made from a polyamide material.

28. A clutch mechanism as described in claim 26 and further comprising a housing which connects to said base wherein said housing has a consistent height, and wherein said height is slightly greater than the height of said locking plate.

29. A telescopically extensible vertical support comprising:

a. an outer tube having an inside diameter;

b. an inner tube having an outside diameter, and wherein the outside diameter of said inner tube is less than the inside diameter of said outer tube and said inner tube slidably resides within said outer tube;

c. a locking mechanism comprising:

(1) a base;
(2) a means for retaining said base to said outer tube;
(3) a locking plate positioned about said inner tube, for retaining said inner tube at a predetermined height within said outer

tube;

(4) a means for maintaining said locking plate in a locking position;

(5) a means for creating a slow continuous compression of said inner tube within said outer tube.

30. A telescopically extensible vertical support as described in claim 29 wherein said means for creating a slow continuous compression comprises:

a. a frictional insert mounted within said locking plate and comprising an integral means for producing numerous degrees of frictional engagement with said inner tube;

b. an adjustable means for varying the frictional engagement of said frictional insert with said inner tube.

31. A telescopically extensible vertical support as described in claim 30 wherein said means for producing numerous degrees of frictional engagement comprises a radiused inner surface on said frictional insert.

32. A telescopically extensible vertical support as described in claim 31 wherein said frictional insert has a substantial width and wherein said radiused portion of said inner edge extends over less than the full width of said ring.

33. A telescopically extensible vertical support as described in claim 31 wherein said radius of said frictional insert is no greater than .125 inches.

34. A telescopically extensible vertical support as described in claim 31 wherein said locking plate comprises a means for increasing the usable life of said frictional insert.

35. A telescopically extensible vertical support as described in claim 34 wherein said ends of said locking plate are mirror images and wherein said means for increasing comprises said mirror image ends.

36. A clutch mechanism as described in claim 30 and further comprising a means for preventing ascent of said inner tube member.

37. A clutch mechanism as described in claim 36 wherein said means for preventing ascent of said inner tube comprises a means for frictionally engaging said inner tube, wherein said means for frictionally engaging is independent of said locking plate.

38. A clutch mechanism as described in claim 37 wherein said means for preventing ascent of said inner tube comprises a locking tab responsive to said adjustable means for varying.

39. A telescopically extensible vertical support as described in claim 35 wherein said adjustable means for varying comprises a screw.

40. A telescopically extensible vertical support as described in claim 32 or 33 wherein said means for maintaining comprises:

a. a yieldingly biasing member on said locking plate;

b. an opposingly biasing member also on said locking plate.

41. A telescopically extensible vertical support as described in claim 30, 32 or 33 and further comprising a housing which connects to said base.

42. A telescopically extensible vertical support as described in claim 41 wherein said frictional insert is made from a material having close static and dynamic coefficients of friction.

43. A telescopically extensible vertical support as described in claim 41 wherein said frictional insert is made from a polyamide material.

44. A safety locking mechanism for use with telescoping poles having an outer

tube member and at least one inner tube member, said mechanism comprising:

a. a base surface positioned about said outer tube member;

b. a means for retaining said base surface to said tube member;

c. a means for maintaining said inner tube member in an extended position, wherein said means for maintaining is superiorly located to said base;

d. a means for permitting compression of said inner tube member within said outer tube member;

e. a means for minimizing necessary operator interaction during compression of said inner member.

45. A safety locking mechanism as described in claim 44 wherein said means for maintaining comprises a locking plate having an opening to allow positioning about said inner tube member.

46. A safety locking mechanism as described in claim 45 wherein said means for maintaining further comprises a frictional insert connected within said opening of said locking plate.

47. A safety locking mechanism as described in claim 46 wherein said frictional insert comprises a means for creating numerous degrees of frictional engagement with said inner tube member.

48. A safety locking mechanism as described in claim 47 and further comprising a means for varying the degree of frictional engagement of said internal frictional insert with said inner tube.

49. A safety locking mechanism as described in claim 44 wherein said means for permitting compression operates in a slow and continuous manner.

50. A safety locking mechanism as described in claim 49 wherein said means for permitting compression in a slow and continuous manner comprises a means for varying the frictional engagement of said frictional insert with said inner tube.

51. A safety locking mechanism as described in claim 46, 47, 48, 49 or 50 wherein said frictional insert is made from a material having close static and dynamic coefficients of friction.

52. A safety locking mechanism as described in claim 46, 47, 48, 49 or 50 wherein said frictional insert is made from a polyamide material.

53. A clutch mechanism as described in claim 48 and further comprising a means for preventing ascent of said inner tube member.

54. A clutch mechanism as described in claim 53 wherein said means for preventing ascent of said inner tube comprises a means for frictionally engaging said inner tube, wherein said means for frictionally engaging is independent of said locking plate.

55. A clutch mechanism as described in claim 54 wherein said means for preventing ascent of said inner tube comprises a locking tab responsive to said adjustable means for varying.

56. A safety locking mechanism as described in claim 48 or 50 wherein said means for varying the frictional engagement comprises a screw which engages said locking plate.

57. A safety locking mechanism as described in claim 44 wherein said means for minimizing necessary operator interaction comprises a means for setting

the rate of compression of said inner tube.

58. A safety locking mechanism as described in claim 57 wherein said means for setting the rate of compression comprises:

a. a locking plate positioned about said inner tube;

b. a frictional insert mounted within said locking plate, and comprising a means for producing numerous degrees of frictional engagement between said insert and said inner tube;

c. an adjustable means for varying the frictional engagement of said frictional insert with said inner tube.

59. A safety locking mechanism as described in claim 46 or 58 wherein said frictional insert comprises a radius.

60. A safety locking mechanism as described in claim 59 wherein said frictional insert has a substantial width and wherein said radius extends over less than the full width of said ring.

61. A safety locking mechanism as described in claim 59 wherein said radius is no greater than .125 inches.

62. A device for creating a fluidless hydraulic-like compression of a telescoping pole in a clutch mechanism having an outer tube member and an inner tube member, and a pivot for putting said device in a slanted position, said device comprising:

a. a rigid locking plate, wherein said locking plate is axially symmetric, and wherein said locking plate comprises an opening defined by an edge of said locking plate for positioning about said inner tube member;

b. a frictional insert connected to the edge of said opening in said locking plate and also positioned about said inner tube member, wherein said frictional insert is made of a polyamide material and comprises a radius on said internal surface for contacting said inner tube member and capable of producing numerous degrees of frictional engagement;

c. a means for varying the degree of frictional engagement of said frictional insert; and

d. a yieldingly biasing member for maintaining said device in a locked position, wherein said member is proximate a single end of said locking plate.

63. A device for creating a fluidless hydraulic-like compression of a telescoping pole as described in claim 62 wherein said radius is no greater than .125 inches.

64. A device for creating a fluidless hydraulic-like compression of a telescoping pole as described in claim 62 wherein said means for varying the frictional engagement comprises a screw which engages said locking plate.

65. A device for creating a fluidless hydraulic-like compression of a telescoping pole as described in claim 52 wherein said locking plate comprises a means for increasing the usable life of said frictional insert.

66. An improvement in utility tripod clutch mechanisms for use with telescoping poles having an outer tube member and an inner tube member, said clutch mechanism having a locking plate with an opening defined by an edge of said locking plate, wherein said opening allows said plate to be positioned about said inner tube member, a pivot for placing said locking plate in a slanted locking position, and a spring member for maintaining said locking plate in a slanted position, the improvement comprising a frictional insert

made of a polyamide material, detachably connected to the edge of said opening in said locking plate, and also positioned about said inner tube member, wherein said frictional insert comprises a radiused internal surface for contacting said inner tube member and capable of producing numerous degrees of frictional engagement based on the slant of said device, wherein said locking plate is axially symmetric allowing said frictional insert to be dually positioned to increase the usable life of said ring, and wherein said spring member is proximate a single end of said locking plate.

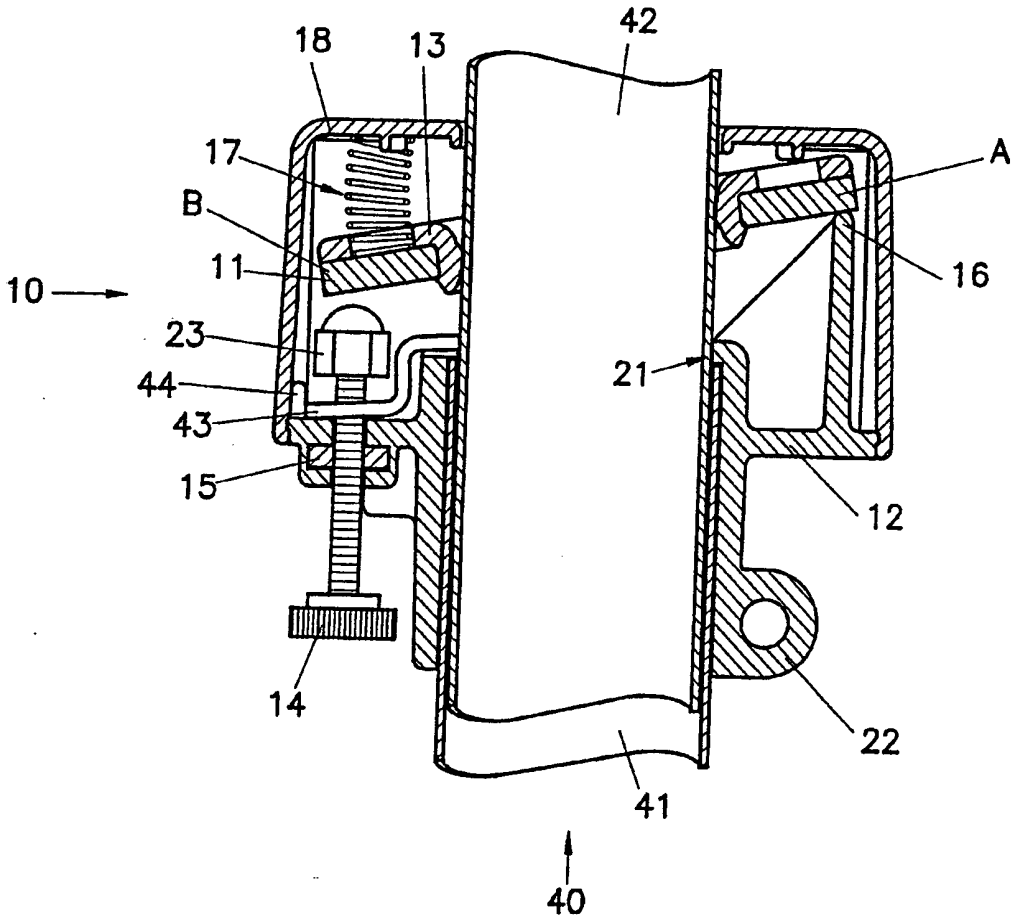

Figure 1

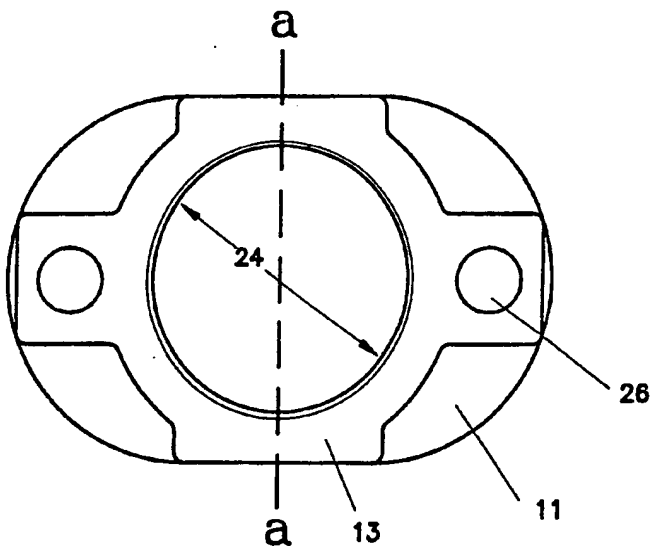

Figure 2

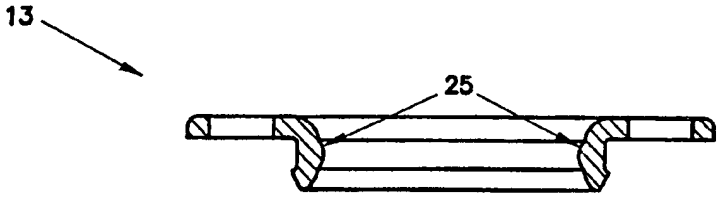

Figure 3

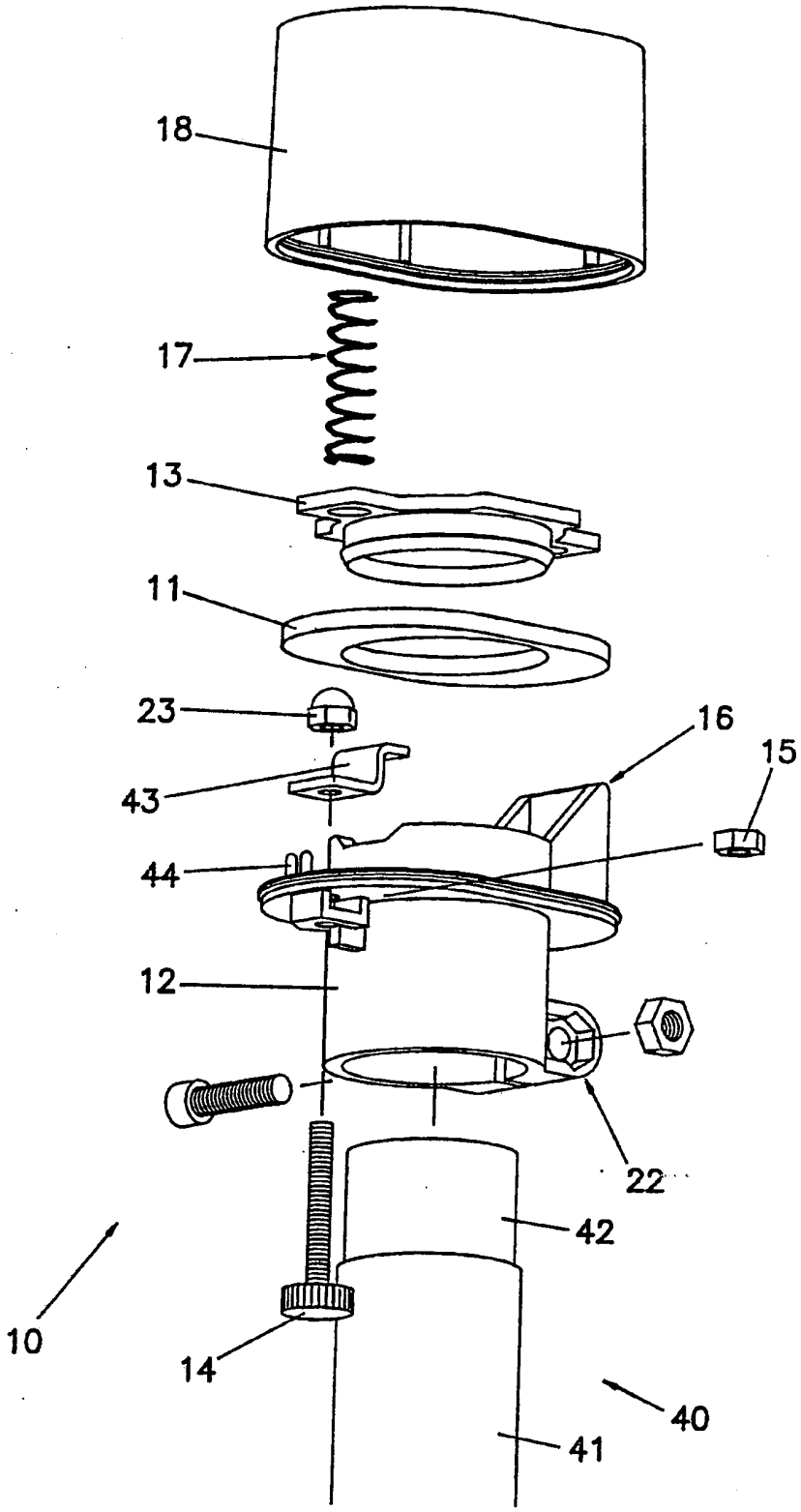

Figure 4

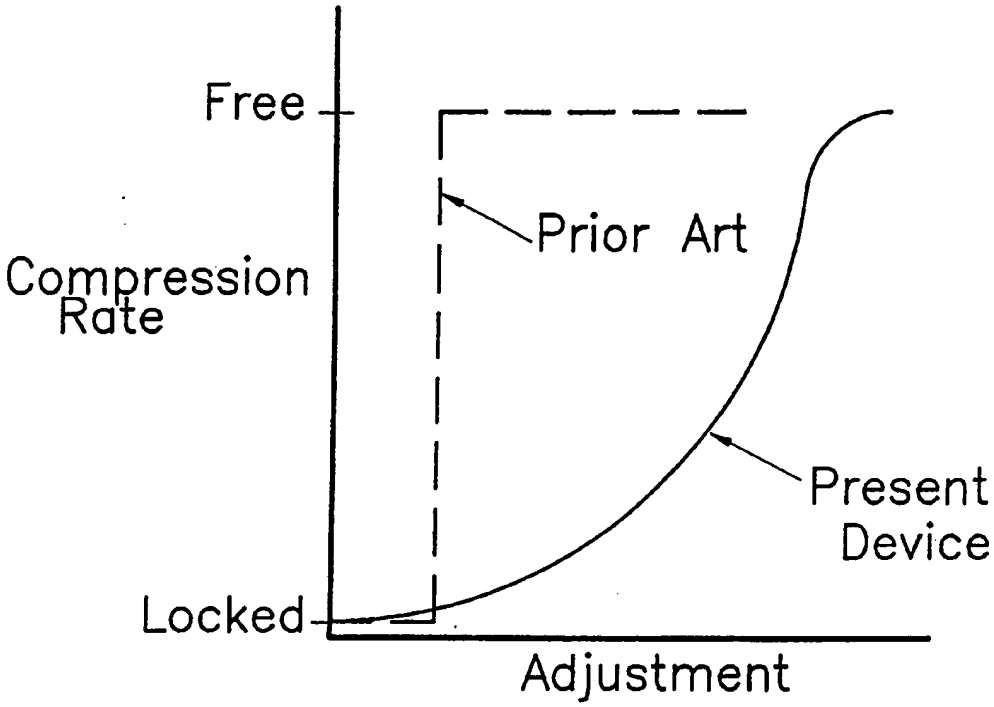
Free
Prior Art
Compression
Rate
Present
Device
Locked
Adjustment

Figure 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 92/10749

A. CLASSIFICATION OF SUBJECT MATTER

IPC5: F16B 7/16, F16M 11/26
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: F16B, F16M, B23Q, A47B, A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP, A1, 0021423 (PIERRAT, MICHEL A.), 7 January 1981 (07.01.81), page 1, line 1 - line 8	1,13,29,44, 62
A	FR, A1, 2522743 (TOMSON BRANDT), 9 Sept 1983 (09.09.83), page 3, line 4 - line 21	1,13,29,44, 62
A	WO, A1, 8503746 (LUNDQVIST, KELD), 29 August 1985 (29.08.85), page 1, line 1 - page 2, line 30	1,13,29,44, 62

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
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"P" document published prior to the international filing date but later than the priority date claimed
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"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
22 February 1993	17 MAR 1993
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patendaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Herman Phalén

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INTERNATIONAL SEARCH REPORT

Information on patent family members

29/01/93

International application No.
PCT/US 92/10749

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A1- 0021423	07/01/81	CA-A- 1136967	07/12/82
		US-A- 4314591	09/02/82
FR-A1- 2522743	09/09/83	NONE	
WO-A1- 8503746	29/08/85	AU-A- 3991285	10/09/85
		EP-A,B- 0174325	19/03/86
		JP-T- 61501277	26/06/86
		US-A- 4664549	12/05/87